

RICARDO BION / DATA SCIENTIST / JAN 30, 2016

# Using Shiny to make decisions at scale



# Outline

- **Examples:** When and why do we use Shiny?
- **Customization:** How do we customize Shiny to our needs?
- **Alternatives:** What are some alternatives to Shiny?

# When and why do we use Shiny?

- Interactive data analyses
- Dashboards with company metrics
- Prototyping new internal and external tools
- Engaging ways to present data

# Interactive data analyses

- Empower others to explore data (with constraints)
- Scale repetitive tasks

# Who should qualify for a Superhost program?



**Hey, I'm Kepa!**

San Francisco, California, United States · Member since June 2010

Hi Guests,  
Thank you for considering staying with me during your visit to San Francisco. Whether you're here for pleasure, or to visit family, I think you will enjoy my rooms and my neighborhood. You can see me with Katie Couric of (SENSITIVE CONTENTS HIDDEN) news in the third floor of the building where I live. She and her crew interviewed me about being an Airbnb host, and took a tour of the Cabana and the garden.

I've been here in San Francisco and in Potrero Hill since 1978, and I can help you figure out what to do and see while you're here. I've had construction and design businesses all my life and I'm enjoying adding another one to my portfolio. I've travelled quite a bit and enjoy having the world come to me! Here are all of my listings:

Verified ID

- Email Address Verified
- Phone Number (redacted) 32
- Facebook 101 Friends
- LinkedIn Validated
- Reviewed 1359 Reviews
- Offline ID Personal Info

Every Superhost has their own style, but they've all reached key hospitality goals.

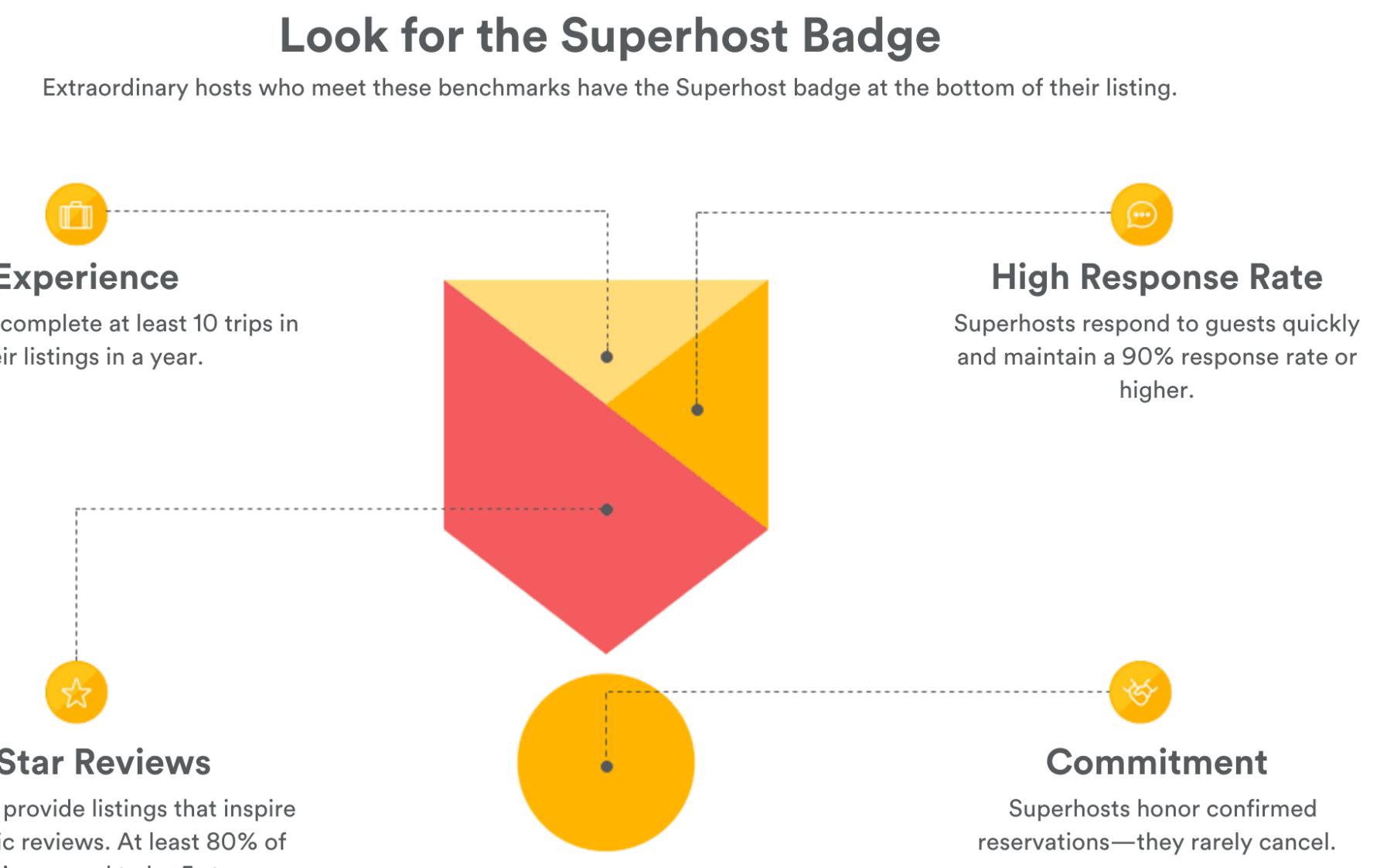
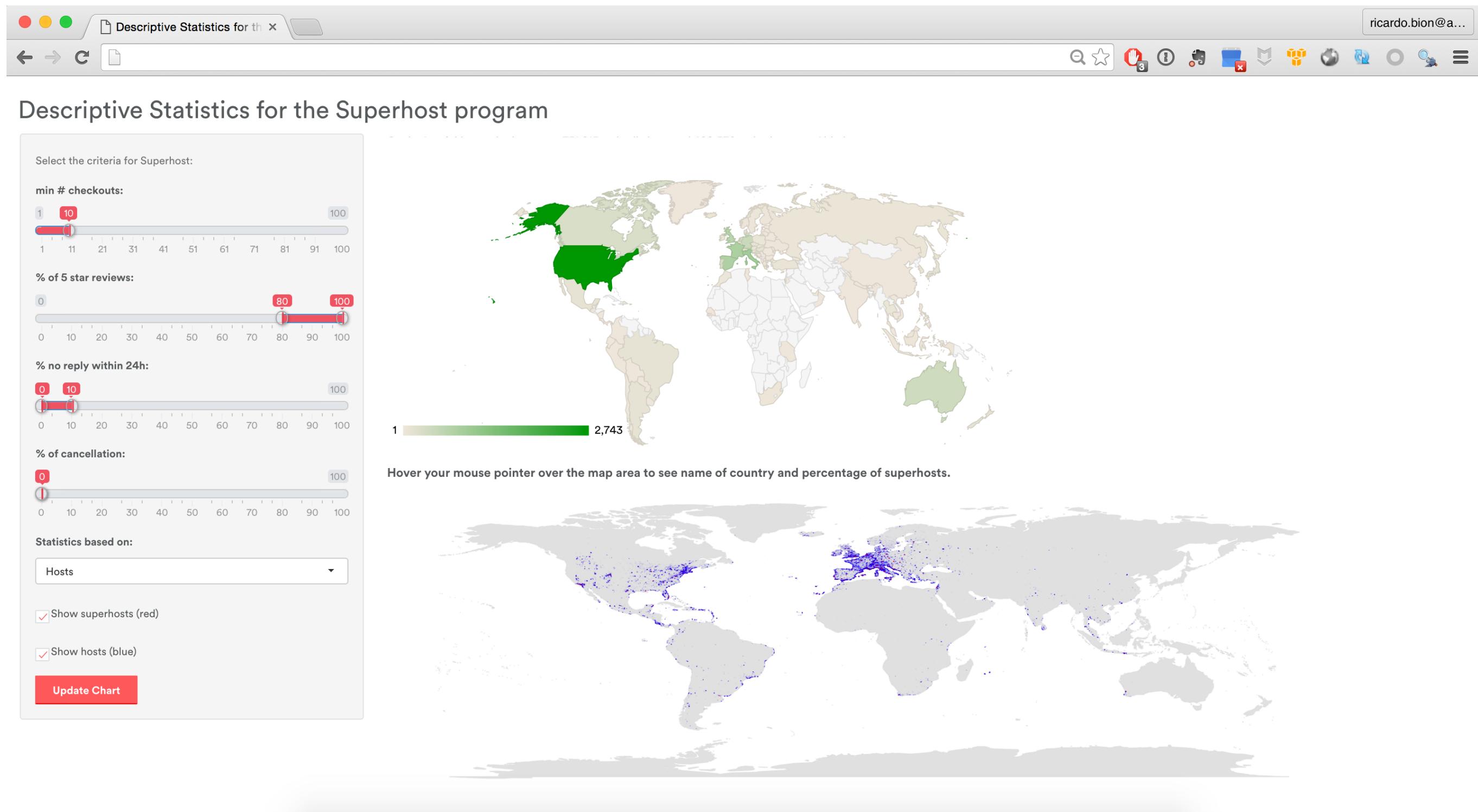
[See What Makes a Superhost](#)

 Superhost 1359 Reviews 1 Reference



- Business partners can explore data

# Who should qualify for a Superhost program?



- googleVis and ggplot2

# How many incremental listings?

- **diagrammeR**

Home Growth Impact Calculator

Based on July 2015 Web Traffic

Launch Month:

Sept 2015

Fraction of Listings Impacted:

1

LYS Impressions

-10% 0% 10%

Conversion to LYS Continue Clicks

-10% 0% 10%

MYL Stage Impacted:

None

Conversion to MYL Stage

-10% 0% 10%

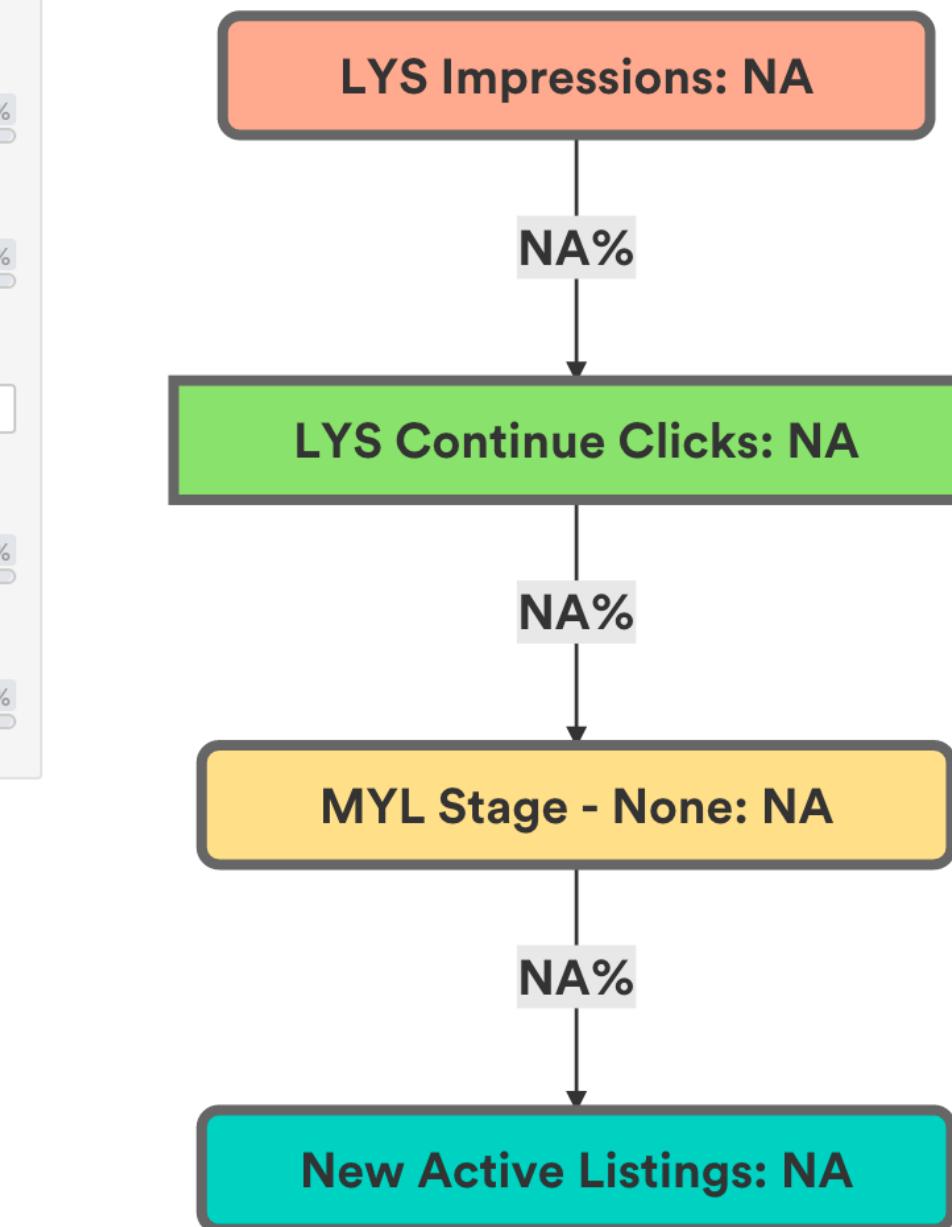
Conversion to New Activations

-10% 0% 10%

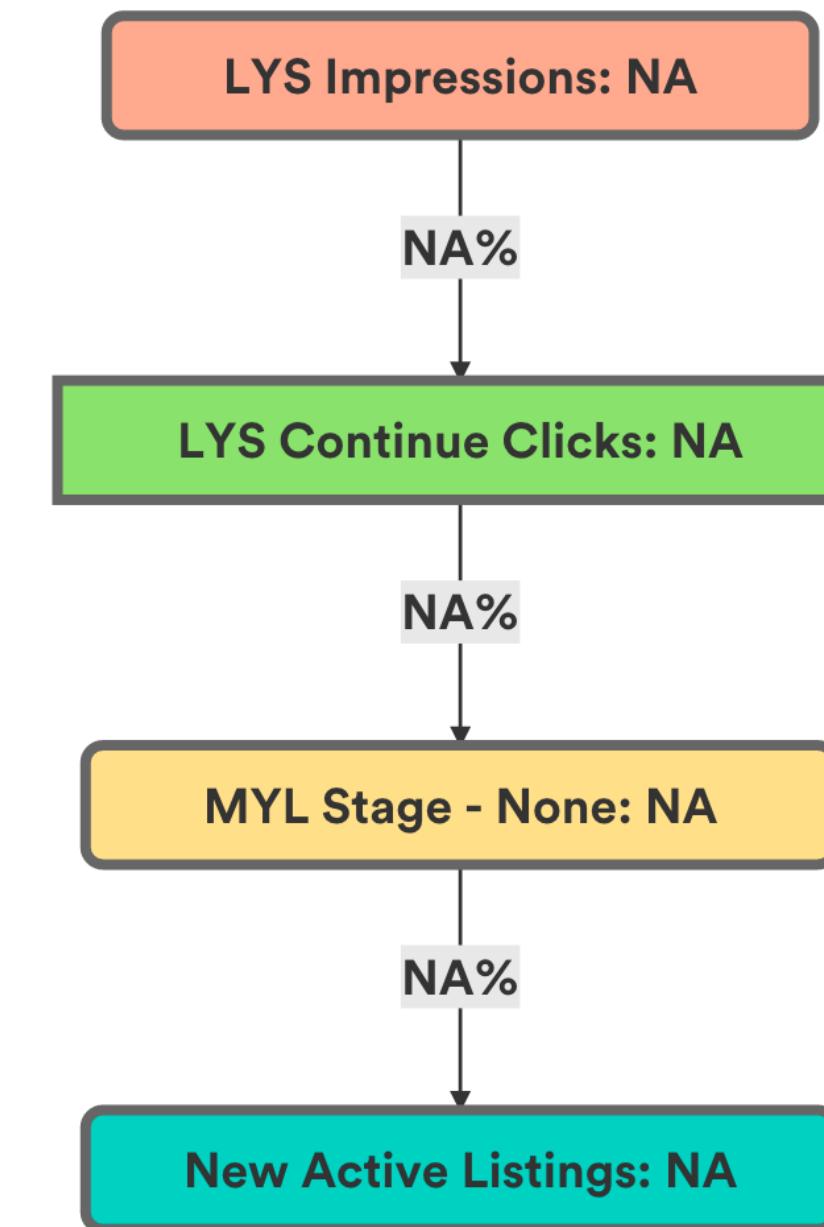
Impact   Incremental Impact   Queries   Definitions

Incremental Listings: 0

Baseline Waterfall



Impacted Waterfall

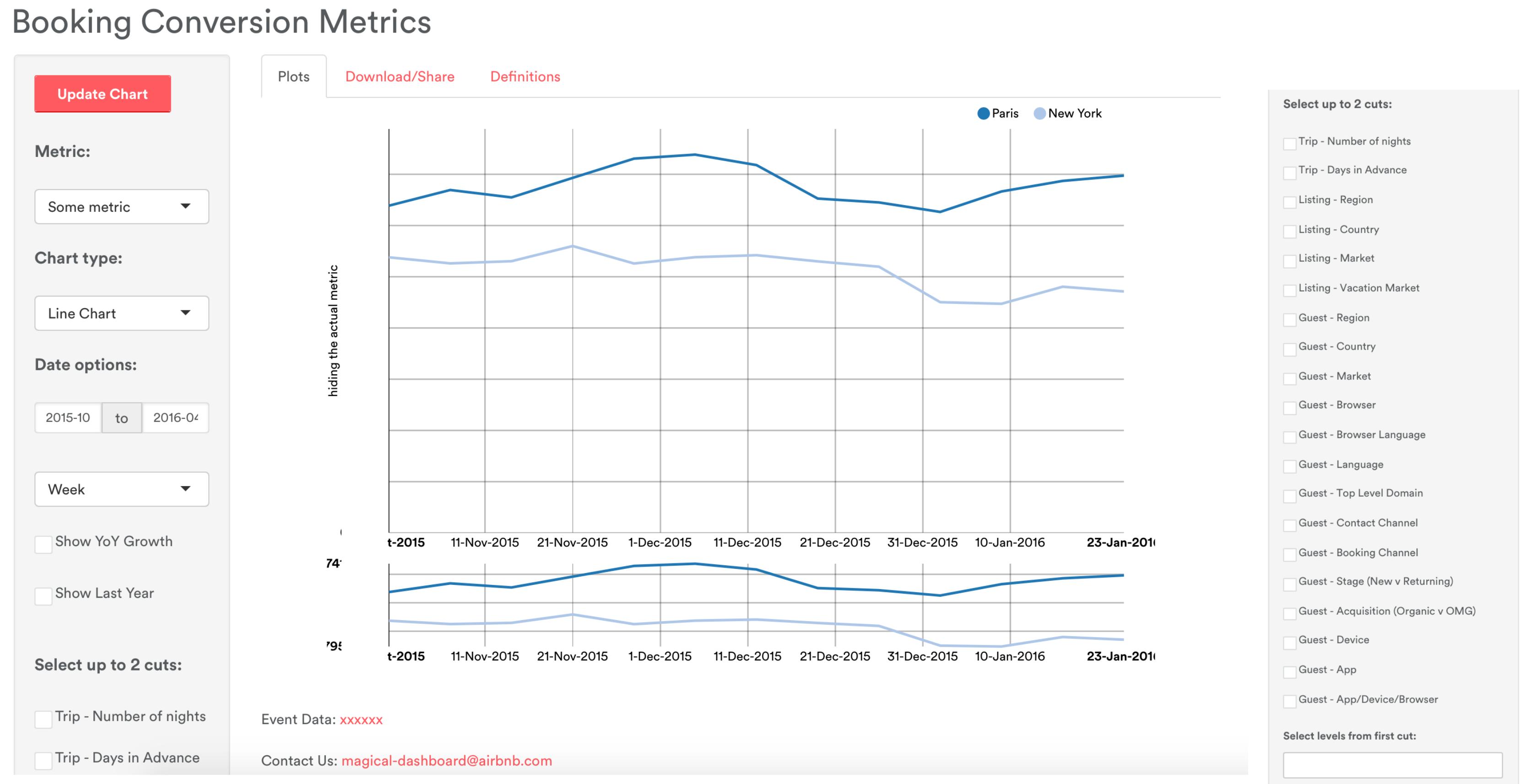


# Dashboards

- Monitor company metrics over time
- Forecasts
- Anomaly detection
- Year-over-year change
- Slice and dice

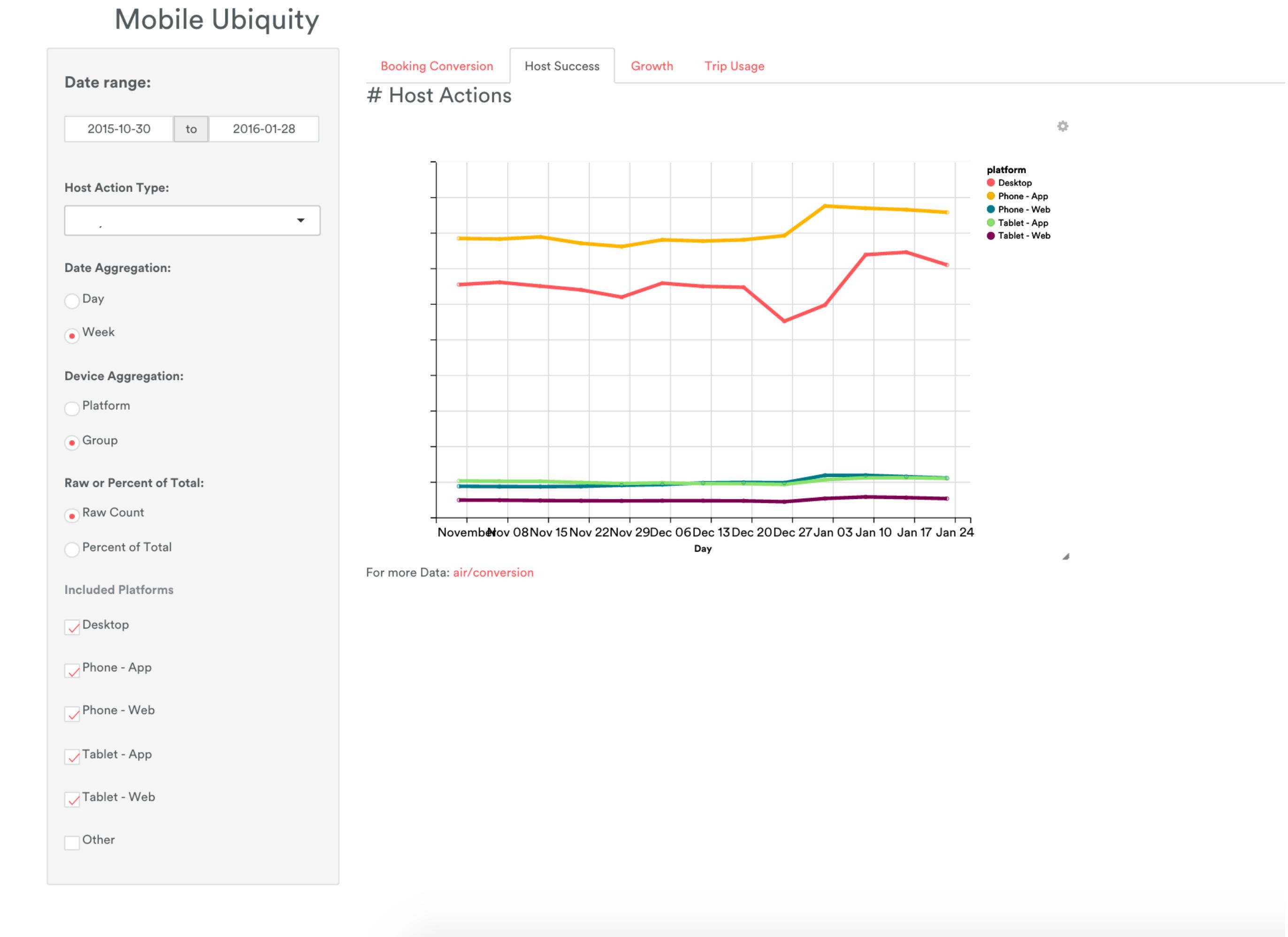
# How many trips last weekend?

- rCharts
- 5k+ custom charts
- pre-aggregation



# How many users on iPhone?

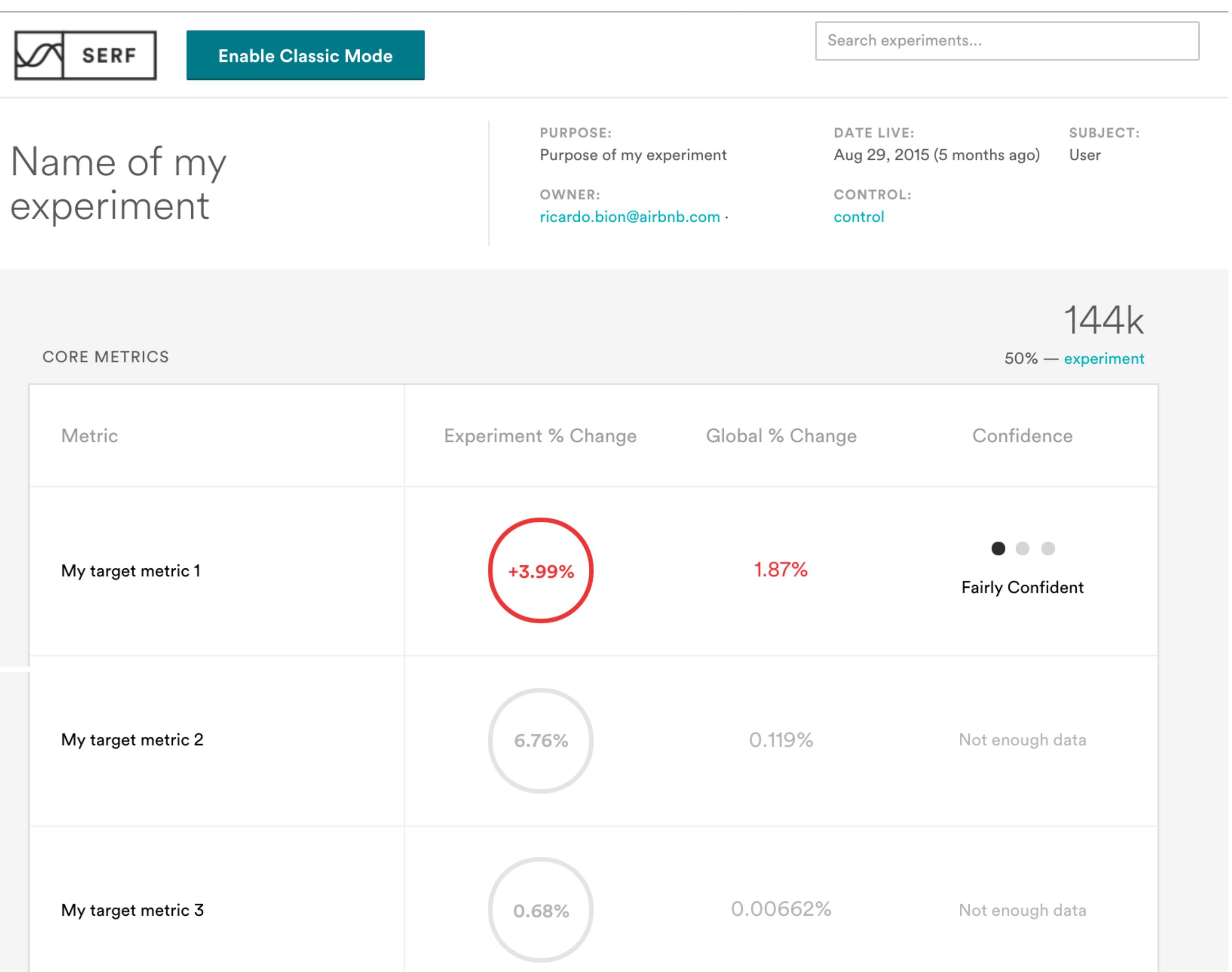
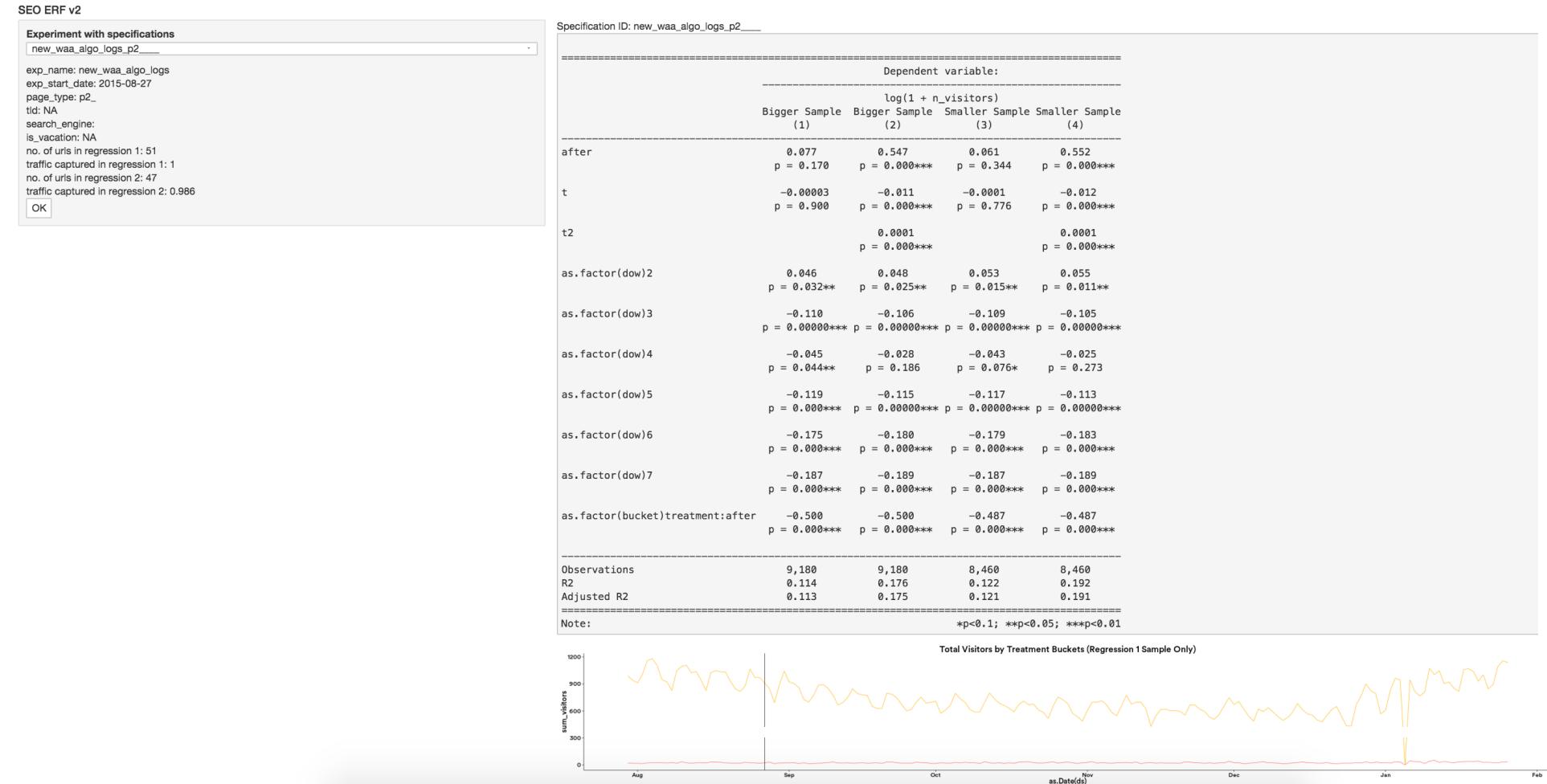
- ggvis
- aggregation in real time



# Internal tools

- A step before scaling
- Test design choices
- Evaluate adoption

# How is my experiment doing?

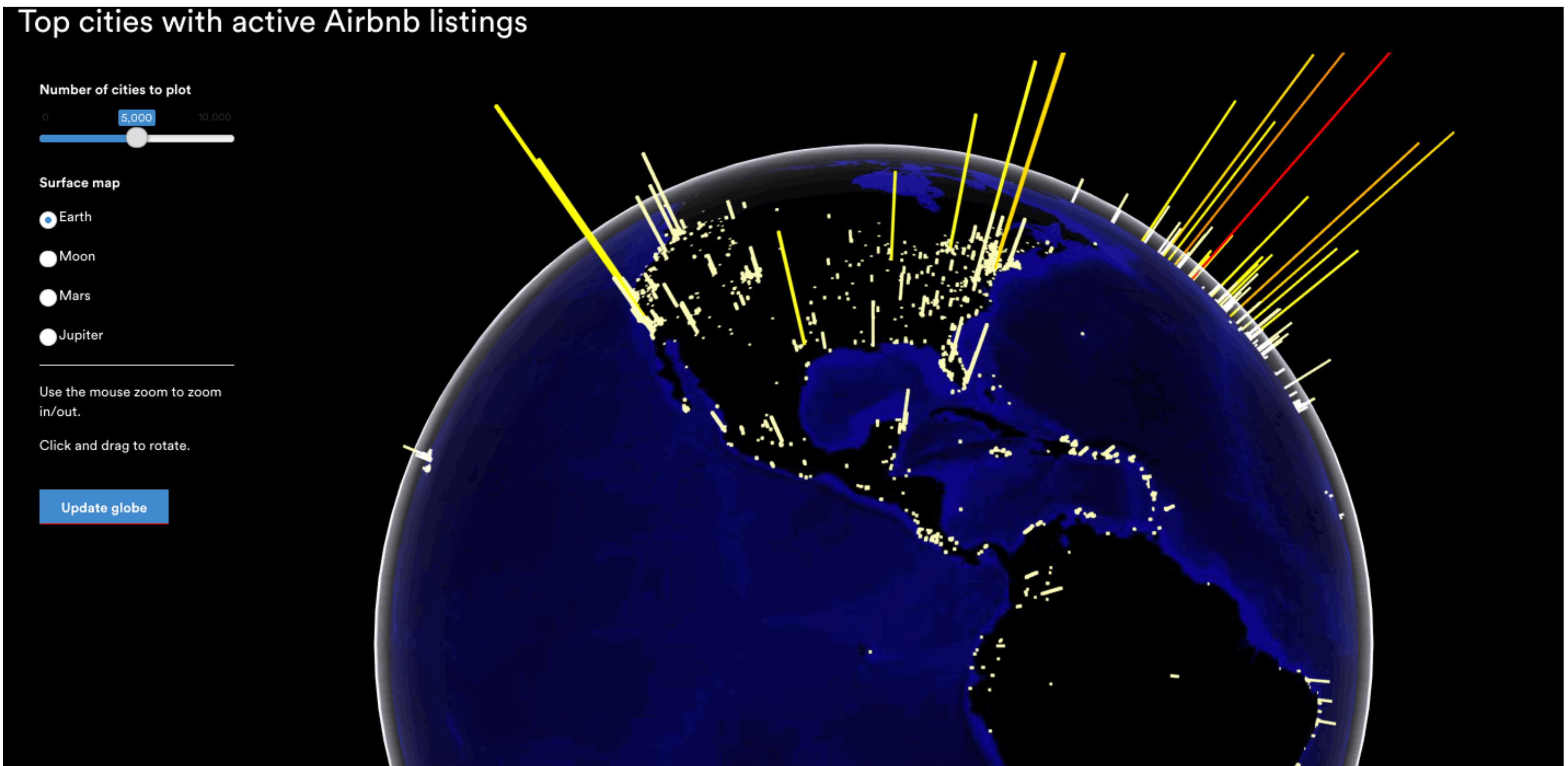


• ggplot2

# Engaging ways to present data

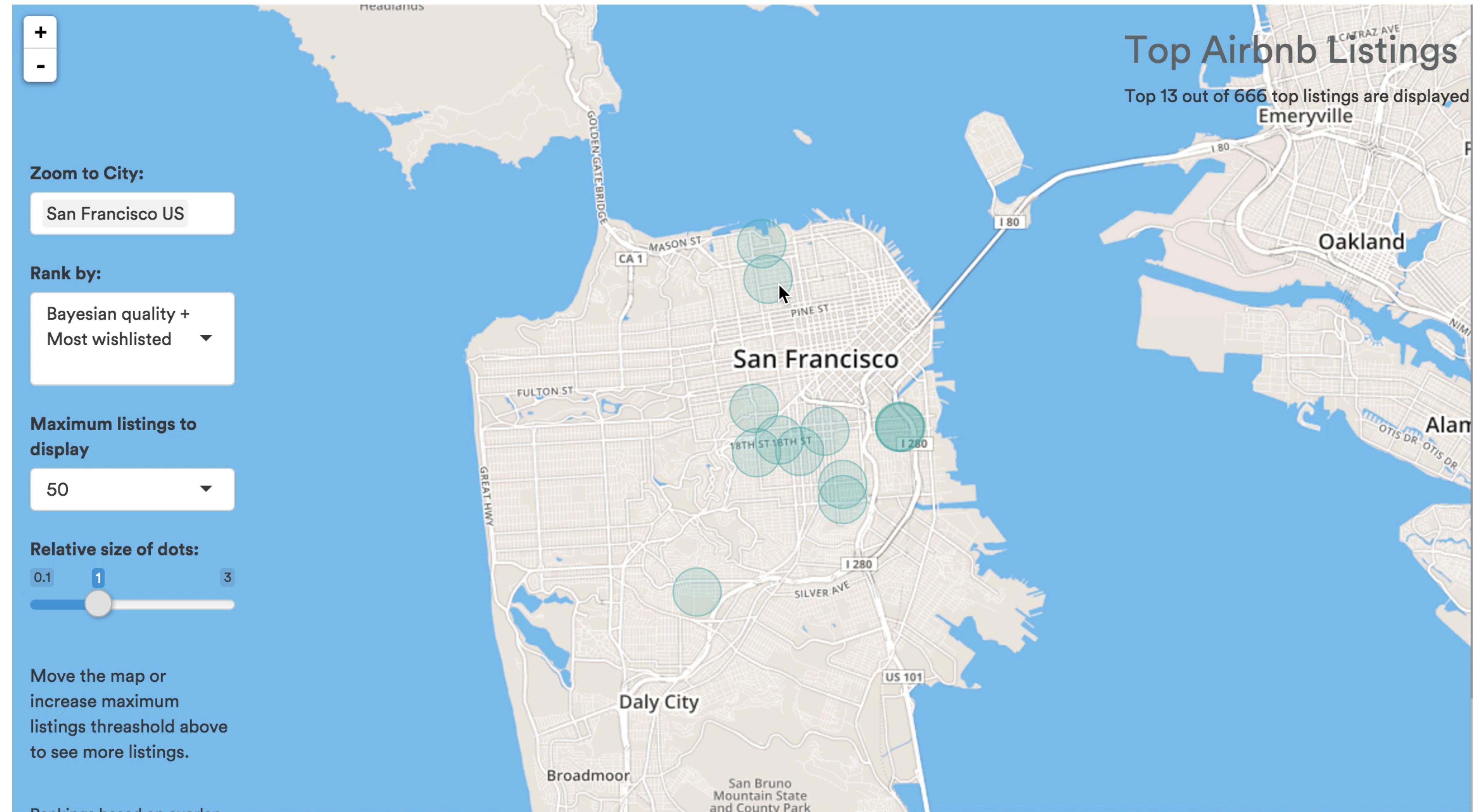
- Tell a story with data
- Make it fun

# How is our supply in different cities?

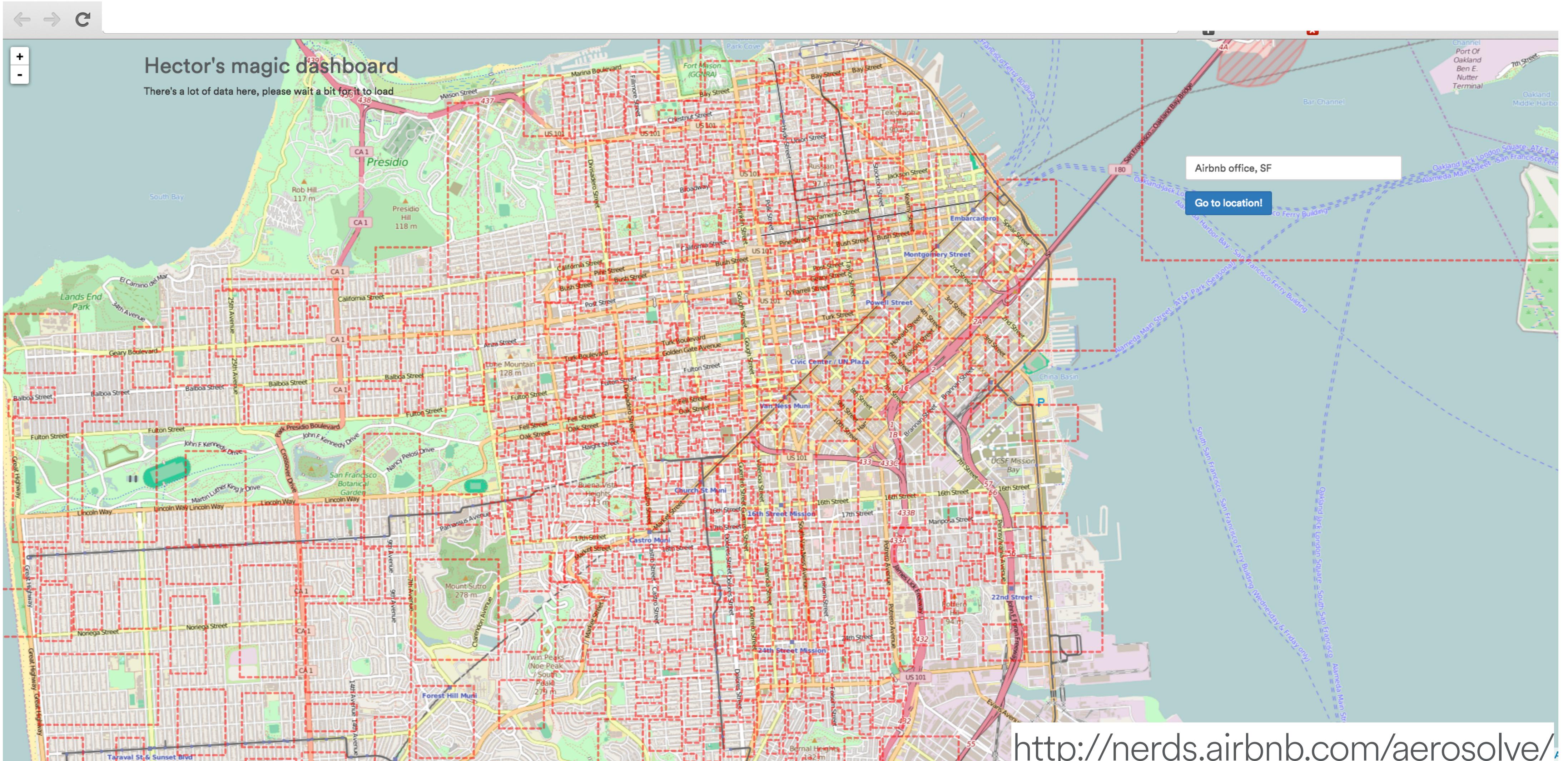


# Which are our guests' favorite listings?

- leaflet



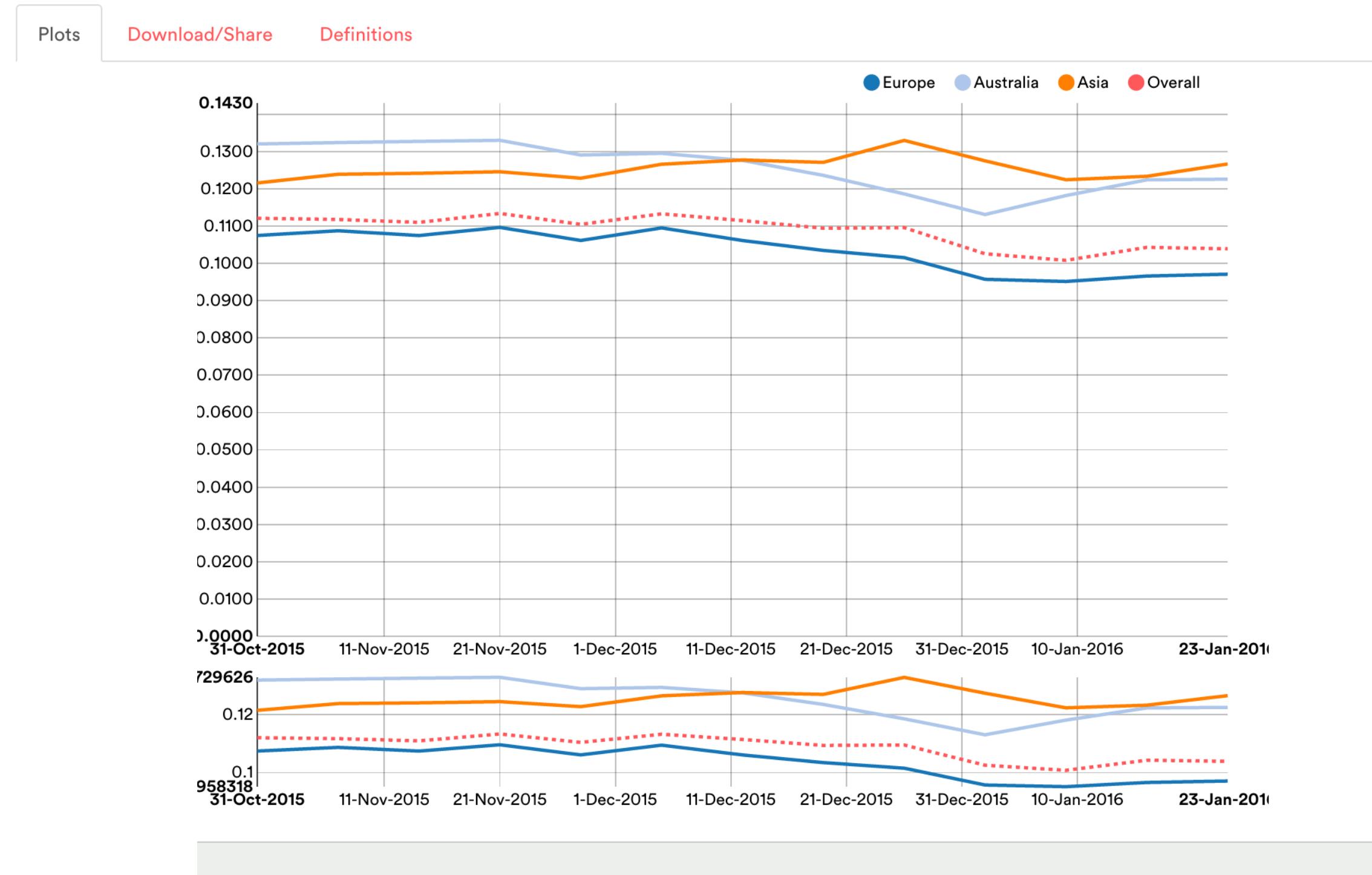
# Kd-trees



# How do we customize Shiny to our needs?

- JavaScript
- CSS
- ggplot2 themes and scales

# Can you make this line dashed?



```
eval(parse(ctx).sprintf('p <- nPlot(
  %s~ds,
  data = data_temp,
  group = "merged_col",
  type = "%s ", y_var, chart_type)))
```

p xAxis(*tickFormat* "#!function(d) {return d3.time.format('%e-%b-%Y')(new Date( (d+1) \* 86400000 ));}!#")

p set(height = )

p chart(*toolTipContent* "#! function(key, x, y){
 if(y <= 0) { return '<h3>' + 'data problem' + '</h3>' + '<p> do not trust </p>' } else {
 if(key.indexOf('Last Year') > -1){
 return '<h3>' + key + '</h3>' +
 '<p>' + y + ' in ' + x.substr(0, x.length - 1) + String(Number(x.substr(x.length - 1)) -1) + '</p>'
 } else {
 return '<h3>' + key + '</h3>' +
 '<p>' + y + ' in ' + x + '</p>'}
 }
} !#")

(chart\_type = "stackedAreaChart") p chart(*style* = 'expand')

position min(data\_temp[,y\_var])  
maxy max(data\_temp[,y\_var])  
miny min(data\_temp[,y\_var])

(chart\_type = "lineWithFocusChart") {

- custom JavaScript

# Can you make it branded?

- custom CSS
- ggplot2 theme and scales

## One metric

Employee user rating

How we did this

Summary of metrics

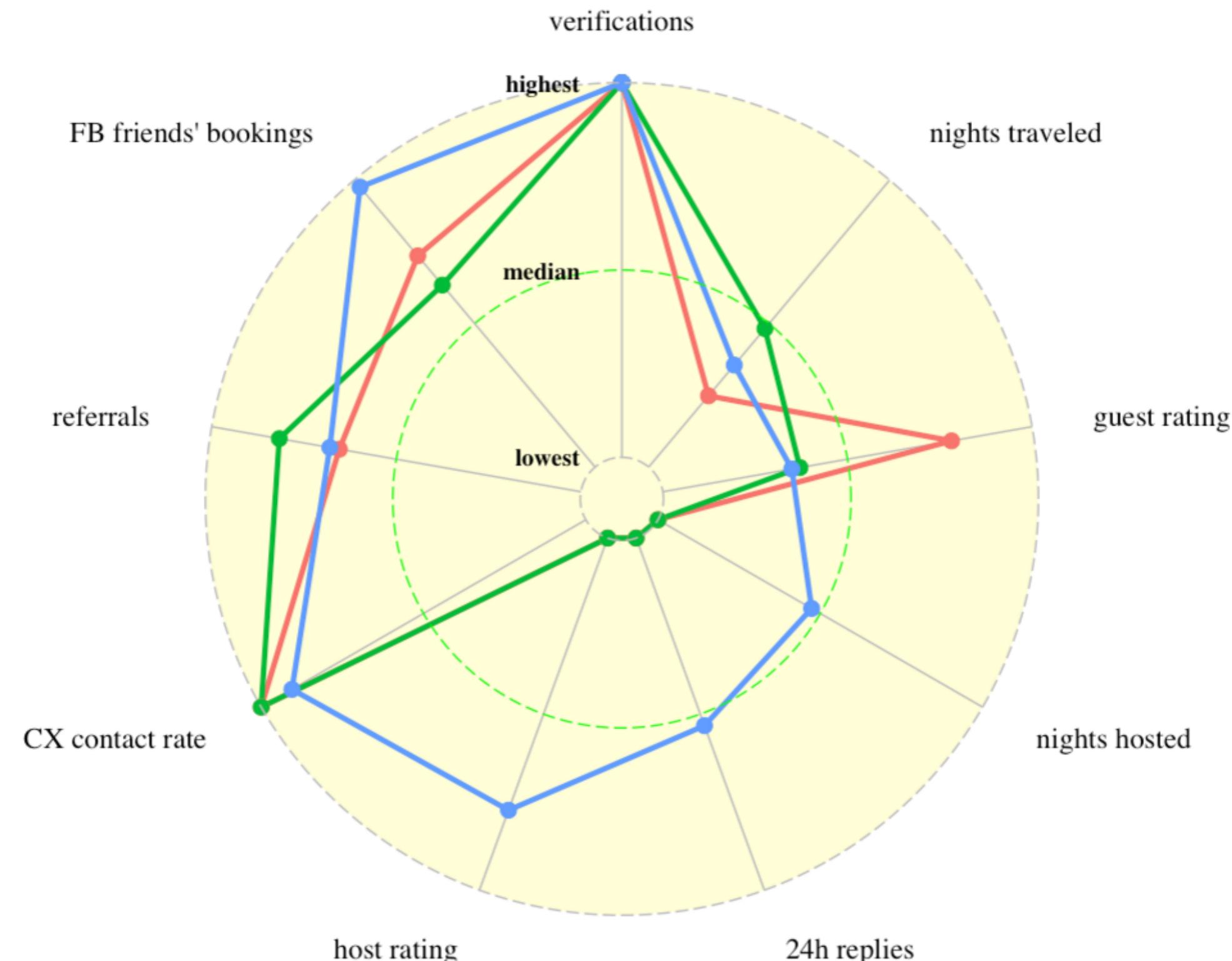
The 100 club

—● Ricardo Bion (top 35%) —● Lisa Qian (top 32%) —● Elena Grewal (top 9%)

Select user(s):

Ricardo Bion Lisa Qian  
Elena Grewal

See Results



# Can you make it branded?

- custom CSS
- ggplot2 theme and scales

## One metric

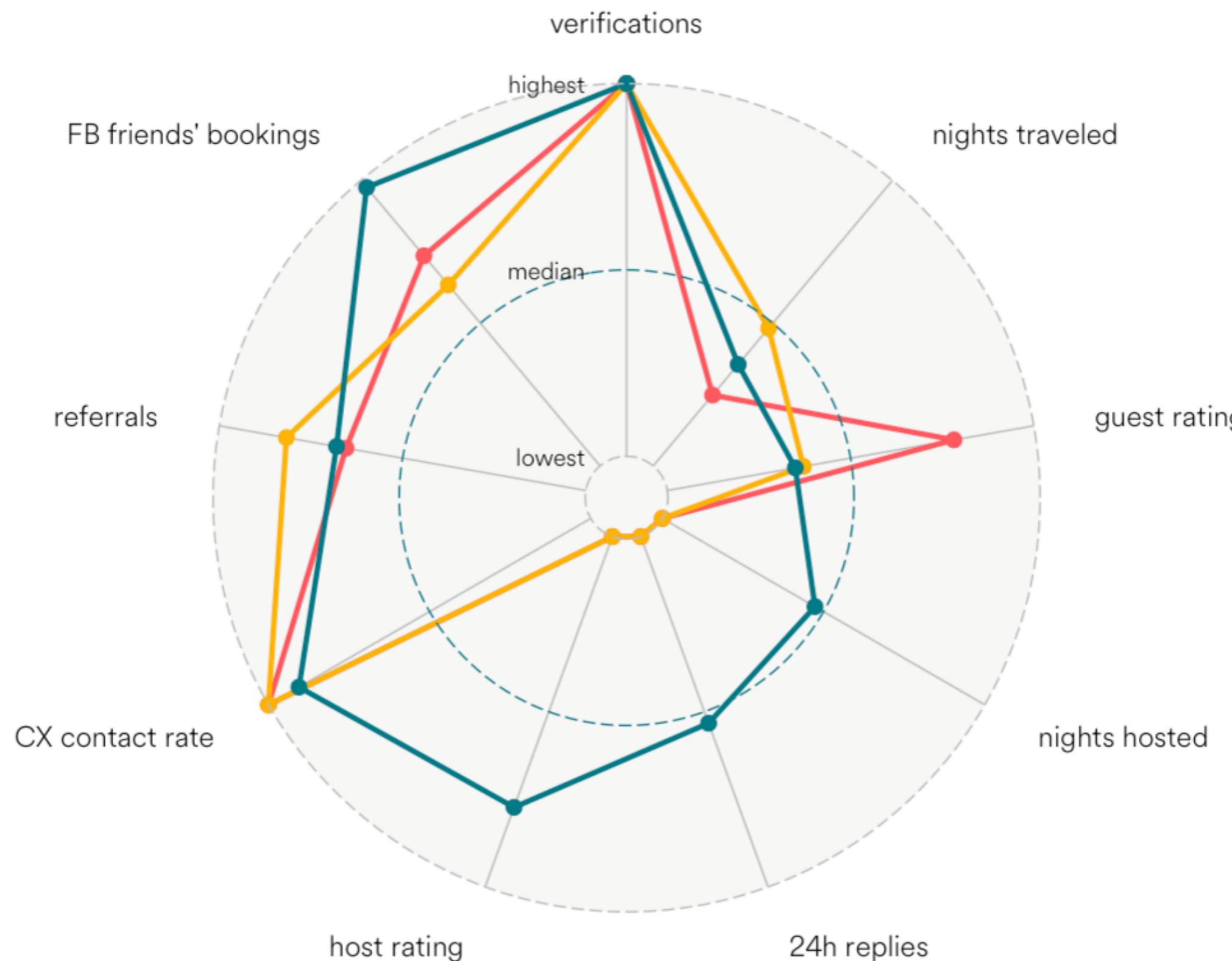
Employee user rating    How we did this    Summary of metrics    The 100 club

—● Ricardo Bion (top 35%) —● Lisa Qian (top 32%) —● Elena Grewal (top 9%)

Select user(s):

Ricardo Bion    Lisa Qian  
Elena Grewal

See Results



# What are some alternatives to Shiny?

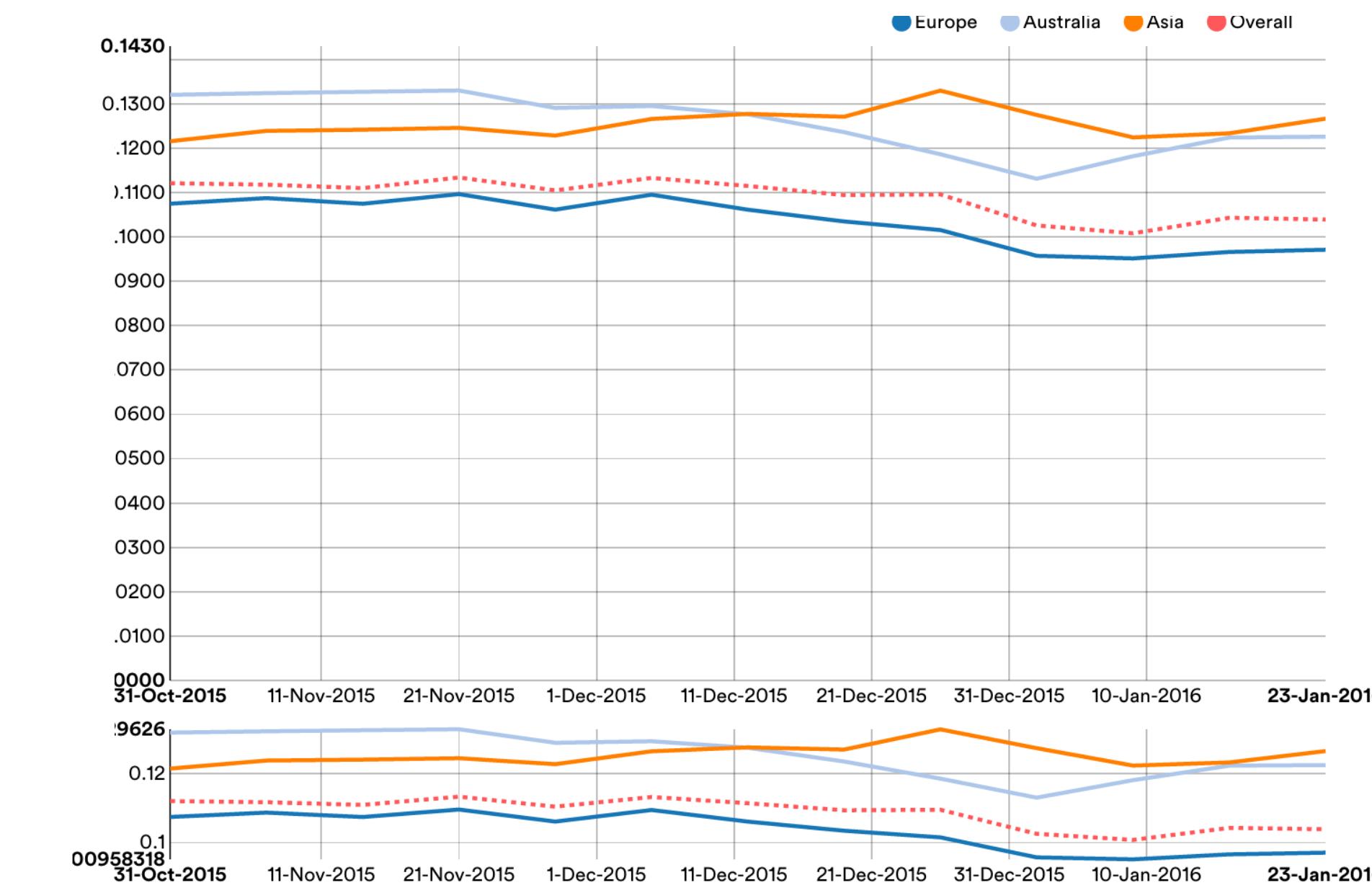
- R generated client side (htmlwidgets and rCharts)
- Interactive RMarkdown
- Tableau
- Panoramix
- Custom website

# Pick three at most

- Easy to code
- Inspectable and reproducible
- Highly customizable
- Easy to deploy and maintain
- Free

# Client side

- Can be updated with Cron job
- No need for Shiny server
- Easy to deploy



- rCharts, highcharter, dygraphs, metricsgraphics, rbokeh

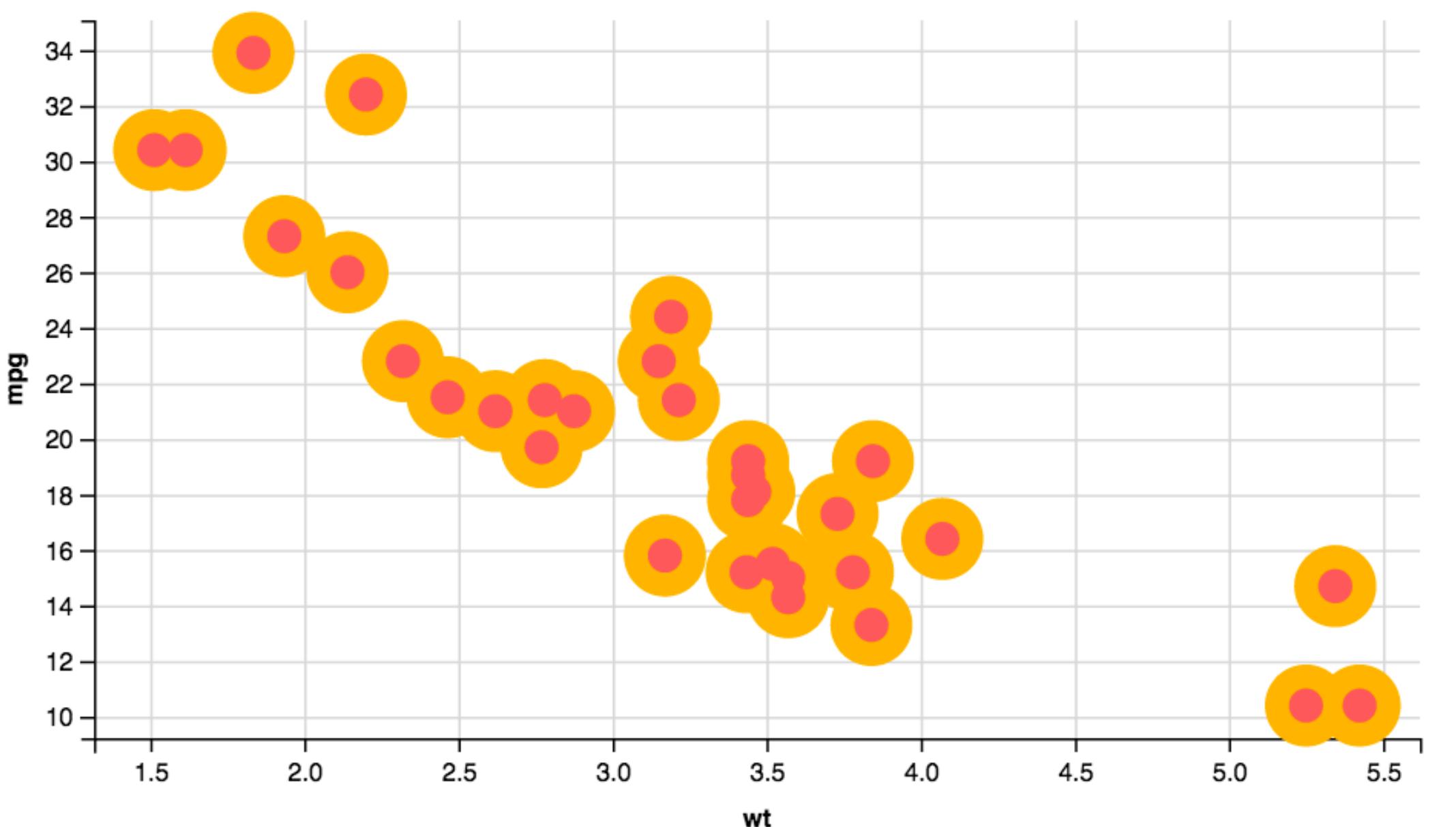
# Interactive rmarkdown files on our new Shiny Server

## RMarkdown

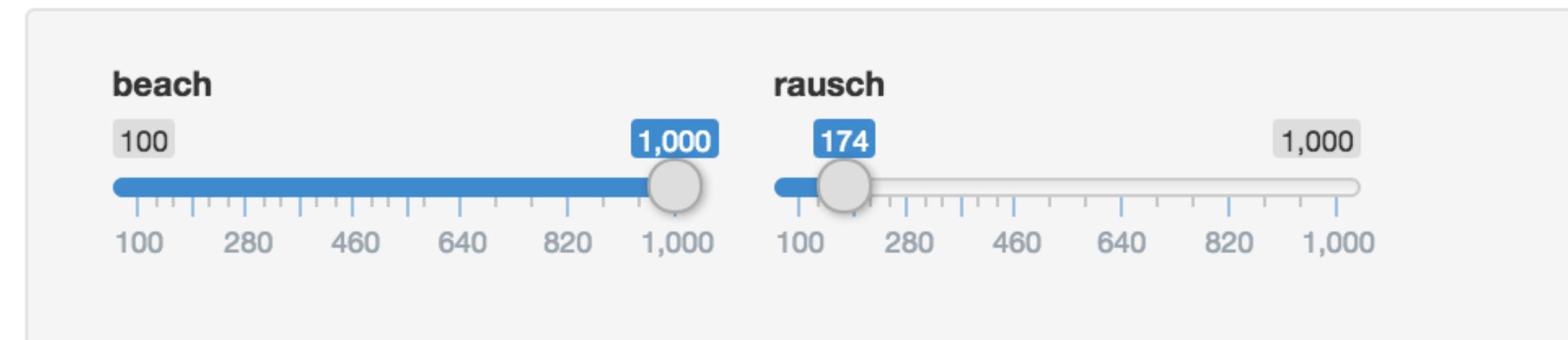
This is all the code I need to create an interactive visualization with Shiny:

```
library(ggvis)

mtcars %>% ggvis(~wt, ~mpg) %>%
  layer_points(fill := "#FFB400", size := input_slider(100, 1000, value = 750, label = "beach")) %>%
  layer_points(fill := "#FF5A5F", size := input_slider(100, 1000, value = 250, label = "rausch")) %>% add_tooltip(function(df) df$wt)
```



- R developers
- Integrate with text



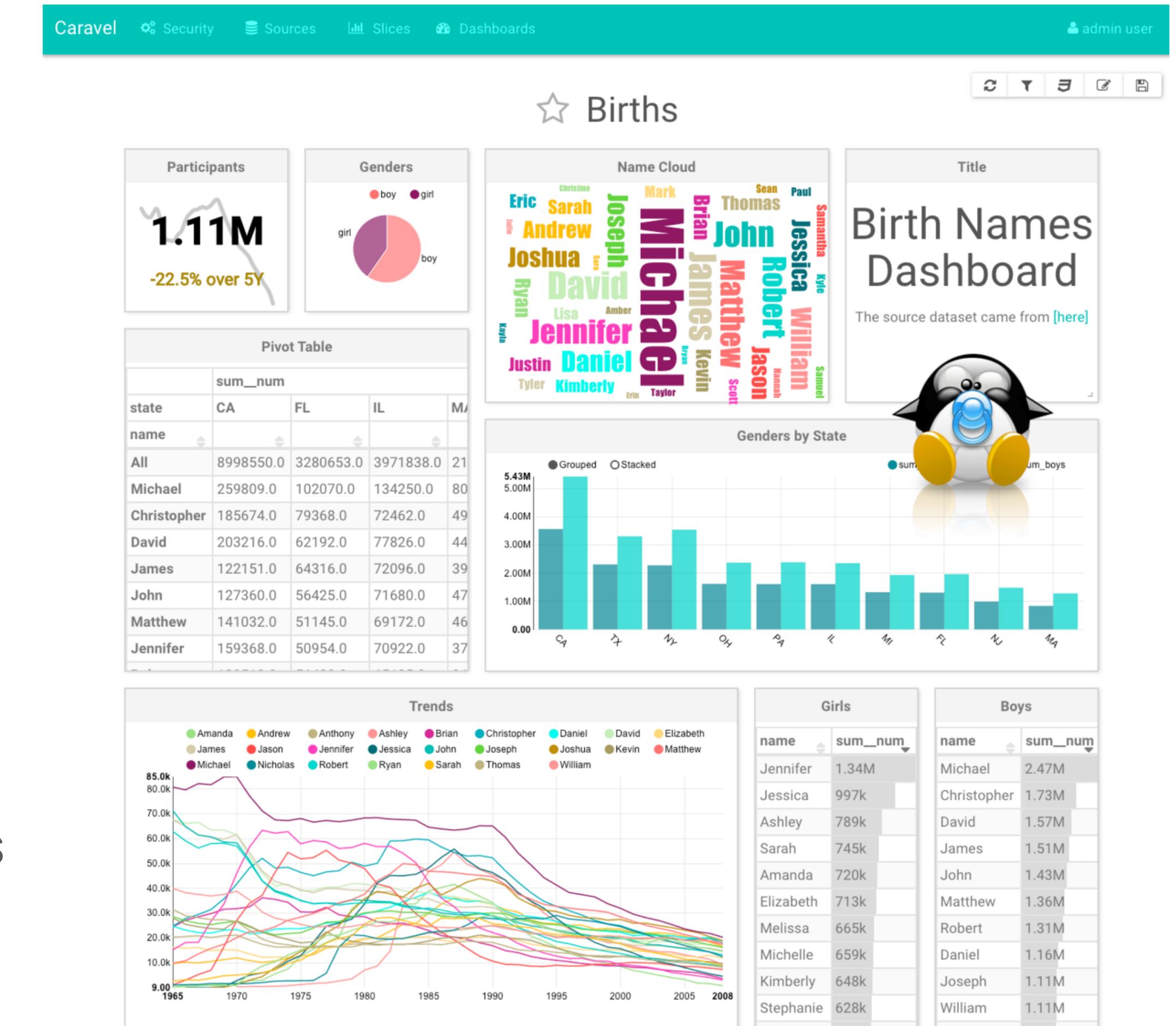
# Tableau

- Very easy to build
- Little transparency
- Limited extensibility
- Expensive



# Caravel

- A quick way to intuitively visualize datasets
- Create and share interactive dashboards
- A rich and extensible set of visualizations
- An extensible, high granularity security model
- A simple semantic layer
- Integration with Druid for slicing and dicing large datasets



<https://github.com/airbnb/caravel>

# Custom website

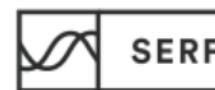
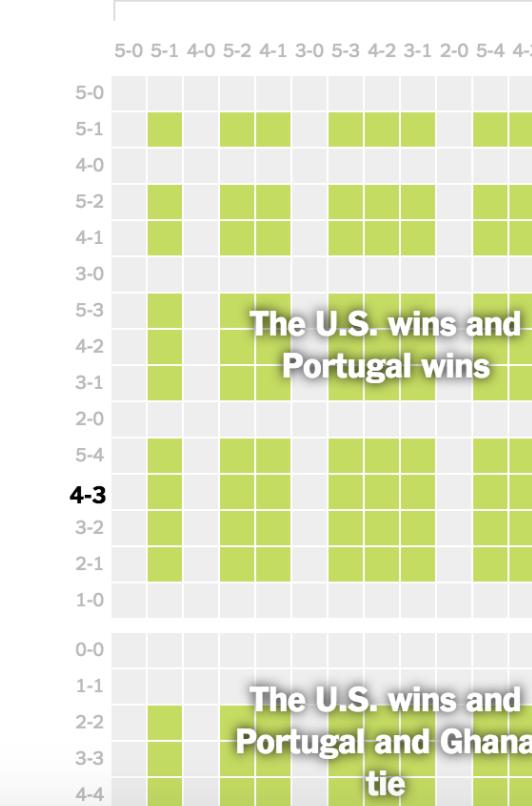
THE UPSHOT | 984 Ways the United States Can Advance to the Next Round of the World Cup

If Portugal **beats Ghana, 2:1**, and Germany **beats the U.S., 1:0**, the United States would **advance**.

USA VS. GERMANY

PORUGAL VS. GHANA

0-1 2-1



Enable Classic Mode

Search experiments...

Name of my experiment

PURPOSE:  
Purpose of my experiment

DATE LIVE:  
Aug 29, 2015 (5 months ago)

SUBJECT:  
User

OWNER:  
ricardo.bion@airbnb.com

CONTROL:  
control

144k

50% — experiment

CORE METRICS

Metric	Experiment % Change	Global % Change	Confidence
My target metric 1	+3.99%	1.87%	Fairly Confident
My target metric 2	6.76%	0.119%	Not enough data
My target metric 3	0.68%	0.00662%	Not enough data

- Exact needs
- A lot of work

# Outline

- **Examples:** When and why do we use Shiny?
- **Customization:** How do we customize Shiny to our needs?
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# Thanks!

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e-mail: [ricardo.bion@airbnb.com](mailto:ricardo.bion@airbnb.com)



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